

Low-Noise, UV-to-SWIR Broadband Photodiodes for Large-Format Focal Plane Array Sensors, Phase II

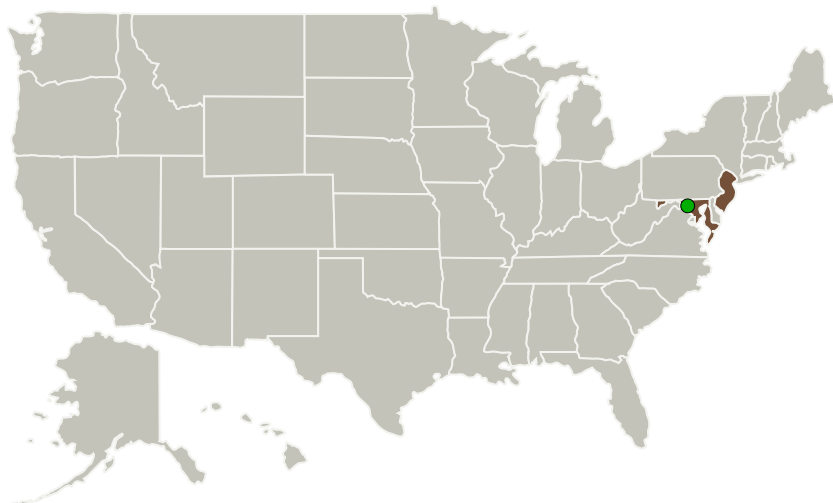
Completed Technology Project (2011 - 2013)



Project Introduction

Broadband focal plane arrays, operating in UV-to-SWIR wavelength range, are required for atmospheric monitoring of greenhouse gases. Currently, separate image sensors are used for different spectral sub-bands: GaN for UV, Si for visible, and InGaAs for SWIR, requiring expensive component-level integration for hyper-spectral imaging. Also, the size of the InGaAs focal plane arrays is currently limited by the InP substrate area. We propose to develop a 640 x 512 UV-to-SWIR focal plane array sensor using GaAs substrate having following photodiode performance: (1) Cut-on Wavelength = 0.25 micron; (2) Cut-off Wavelength = 2.5 micron; (3) RoA > 35 Ohm-cm² at 300K; and (4) Quantum Efficiency > 30% in UV (0.25 to 0.4 micron), > 80% in Visible (0.4 to 0.9 micron), and > 70% in IR (0.9 to 2.5 micron) subbands. Based on P.I.'s experience on SCIAMACHY, this project will enable one image sensor for 8 spectroscopic channels currently orbiting on European Space Agency's ENVISAT.

Primary U.S. Work Locations and Key Partners



Low-Noise, UV-to-SWIR
Broadband Photodiodes for
Large-Format Focal Plane Array
Sensors, Phase II

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Organizations Performing Work	Role	Type	Location
Discovery Semiconductors, Inc.	Lead Organization	Industry Minority-Owned Business	Ewing, New Jersey
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	New Jersey

Project Transitions

**June 2011:** Project Start**October 2013:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139061>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Discovery Semiconductors, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Abhay M Joshi

Co-Investigator:

Abhay Joshi

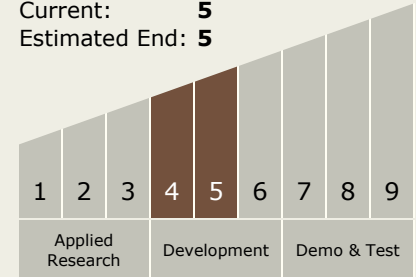
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Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System